Video Data 102

Metadata
Extraction
Module

104

108

Insertion
Interface

Video
Metadata

110

Query
Interface

112

Database System 106

1001

User Query
Interaction

Figure 1: A Video Database System

Brown Building

Blue Sky

Brown car

124

130

128

122
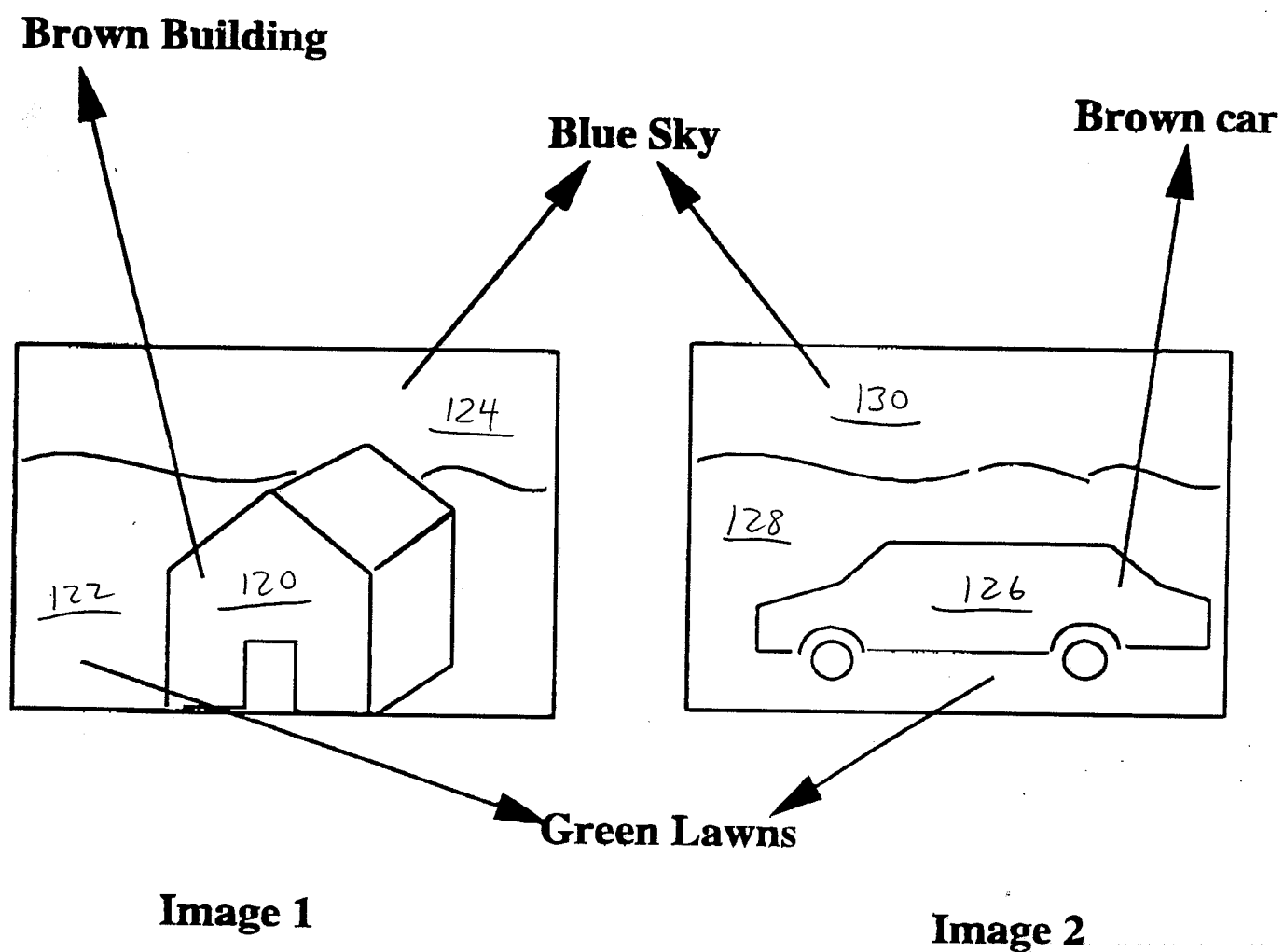
120

126

Green Lawns

Image 1

Image 2

Figure 2 Examples to illustrate the Chromatic and Structural Properties of Images
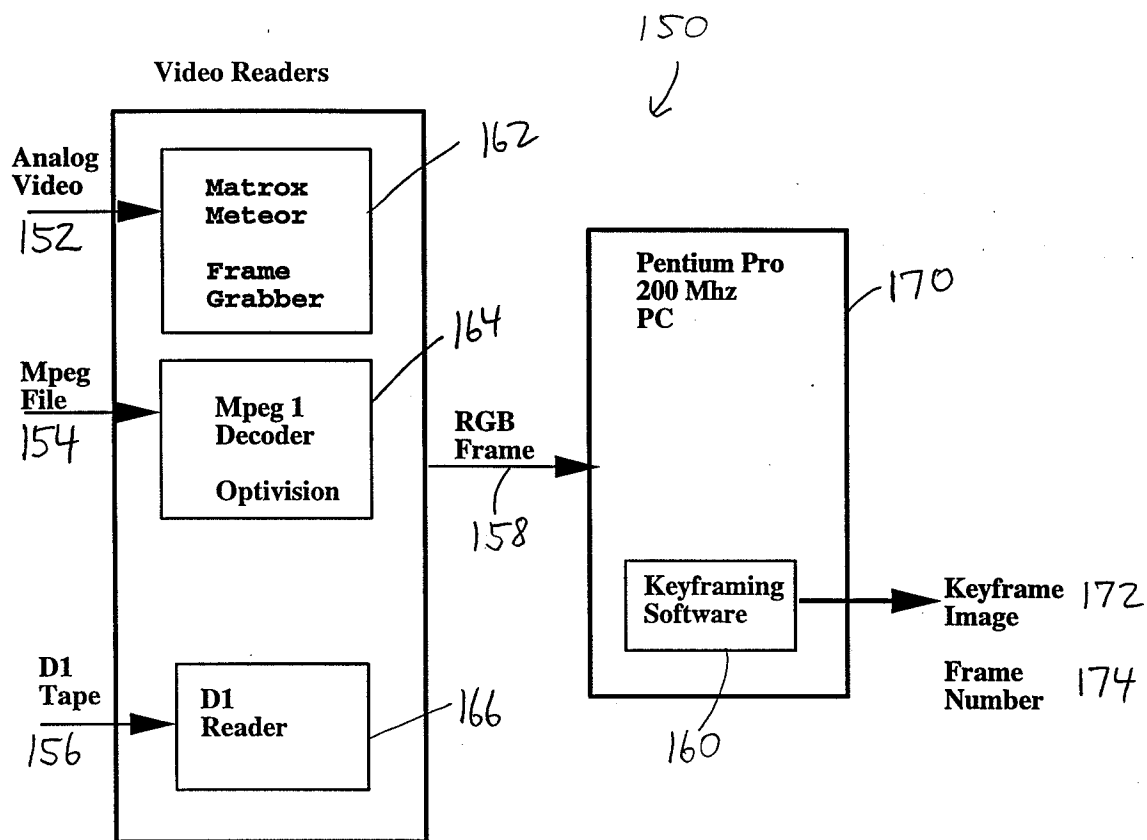
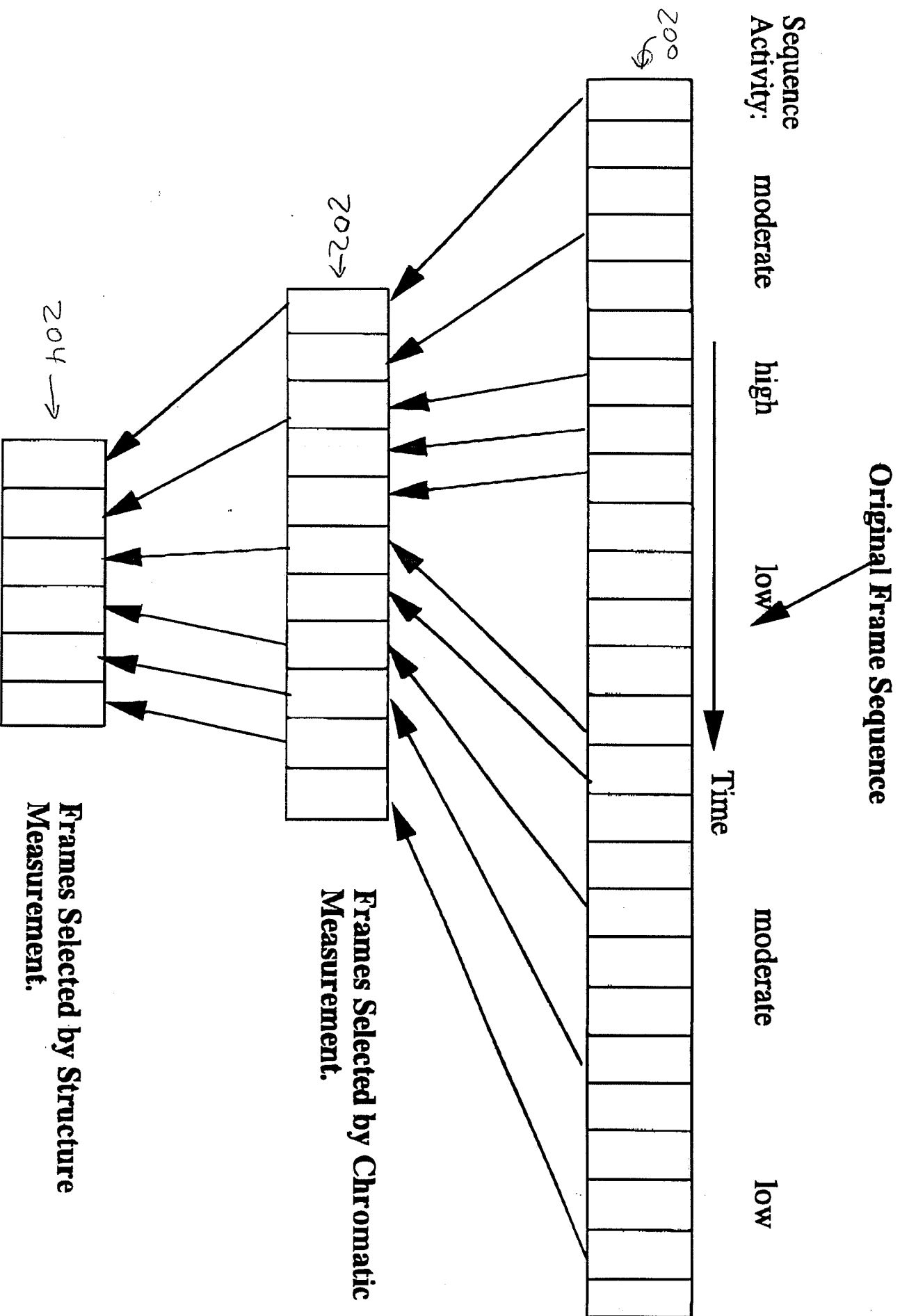Figure 3 The Keyframing System

Figure 4

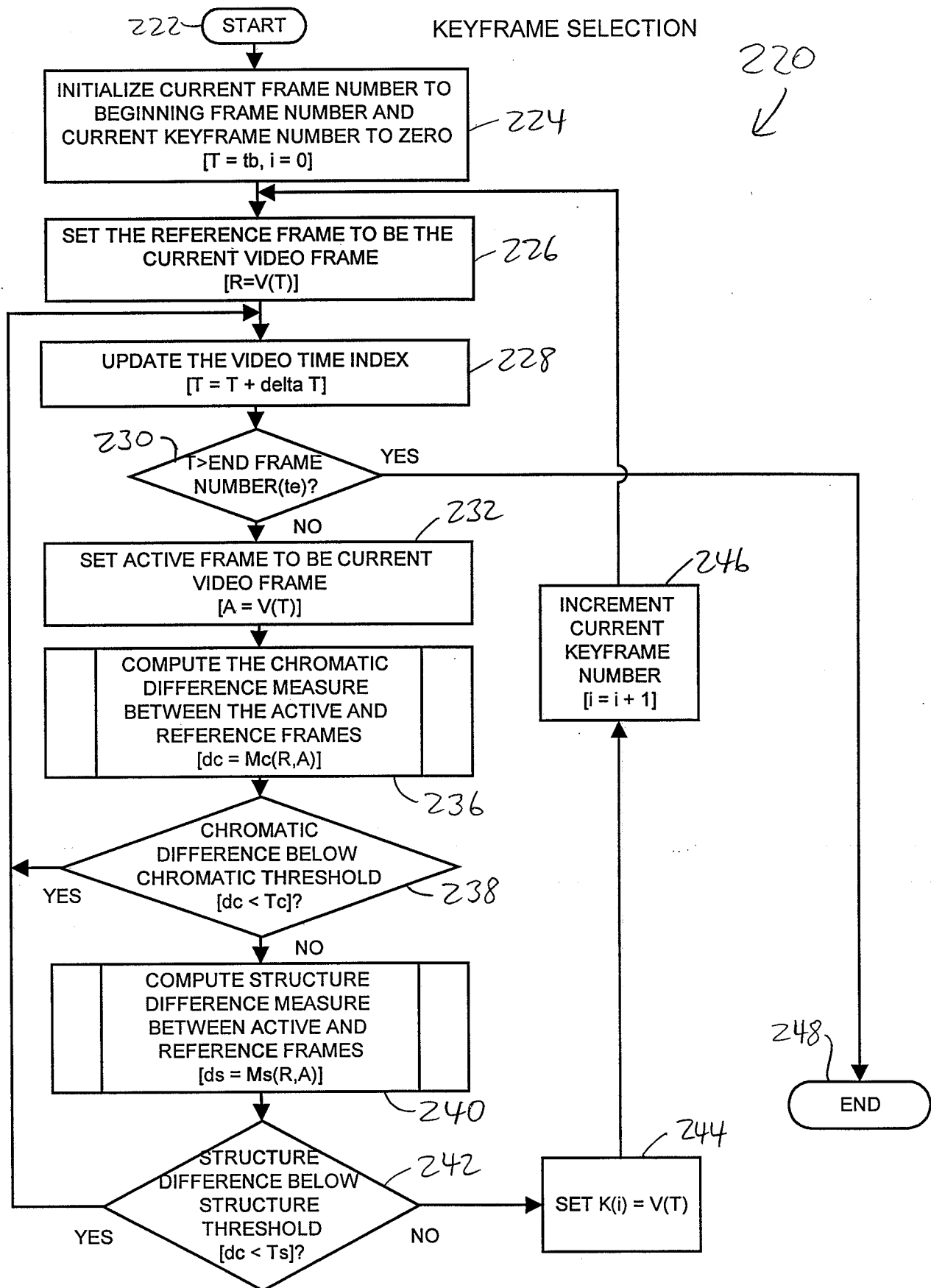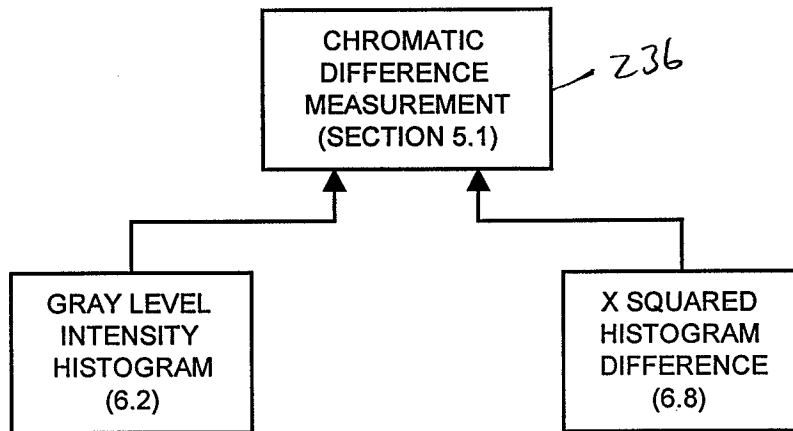222 — (START)   KEYFRAME SELECTION   220

INITIALIZE CURRENT FRAME NUMBER TO
BEGINNING FRAME NUMBER AND
CURRENT KEYFRAME NUMBER TO ZERO
[T = tb, i = 0]   — 224

SET THE REFERENCE FRAME TO BE THE
CURRENT VIDEO FRAME
[R=V(T)]   — 226

UPDATE THE VIDEO TIME INDEX
[T = T + delta T]   — 228

230 — T>END FRAME
NUMBER(te)?   YES

NO

SET ACTIVE FRAME TO BE CURRENT
VIDEO FRAME
[A = V(T)]   — 232

COMPUTE THE CHROMATIC
DIFFERENCE MEASURE
BETWEEN THE ACTIVE AND
REFERENCE FRAMES
[dc = Mc(R,A)]   — 236

CHROMATIC
DIFFERENCE BELOW
CHROMATIC THRESHOLD
[dc < Tc]?   — 238

YES

NO

COMPUTE STRUCTURE
DIFFERENCE MEASURE
BETWEEN ACTIVE AND
REFERENCE FRAMES
[ds = Ms(R,A)]   — 240

STRUCTURE
DIFFERENCE BELOW
STRUCTURE
THRESHOLD
[dc < Ts]?   — 242

YES

NO

SET K(i) = V(T)   — 244

INCREMENT
CURRENT
KEYFRAME
NUMBER
[i = i + 1]   — 246

248 — (END)

FIGURE 5

```
                  ┌─────────────────┐
                  │   CHROMATIC     │
                  │   DIFFERENCE    │      236
                  │   MEASUREMENT   │
                  │   (SECTION 5.1) │
                  └─────────────────┘
                    ▲           ▲
          ┌─────────┘           └─────────┐
  ┌───────────────┐              ┌───────────────┐
  │  GRAY LEVEL   │              │  X SQUARED    │
  │  INTENSITY    │              │  HISTOGRAM    │
  │  HISTOGRAM    │              │  DIFFERENCE   │
  │    (6.2)      │              │    (6.8)      │
  └───────────────┘              └───────────────┘
```

FIGURE 6

FIGURE 7

FIGURE 8

1802   1804   1833   1873

1921   1937   1950   1956

2043   2091   2146   2155

2162   2181   2186   2201

2227   2240   2280   2291

2298   2306   2312   2328
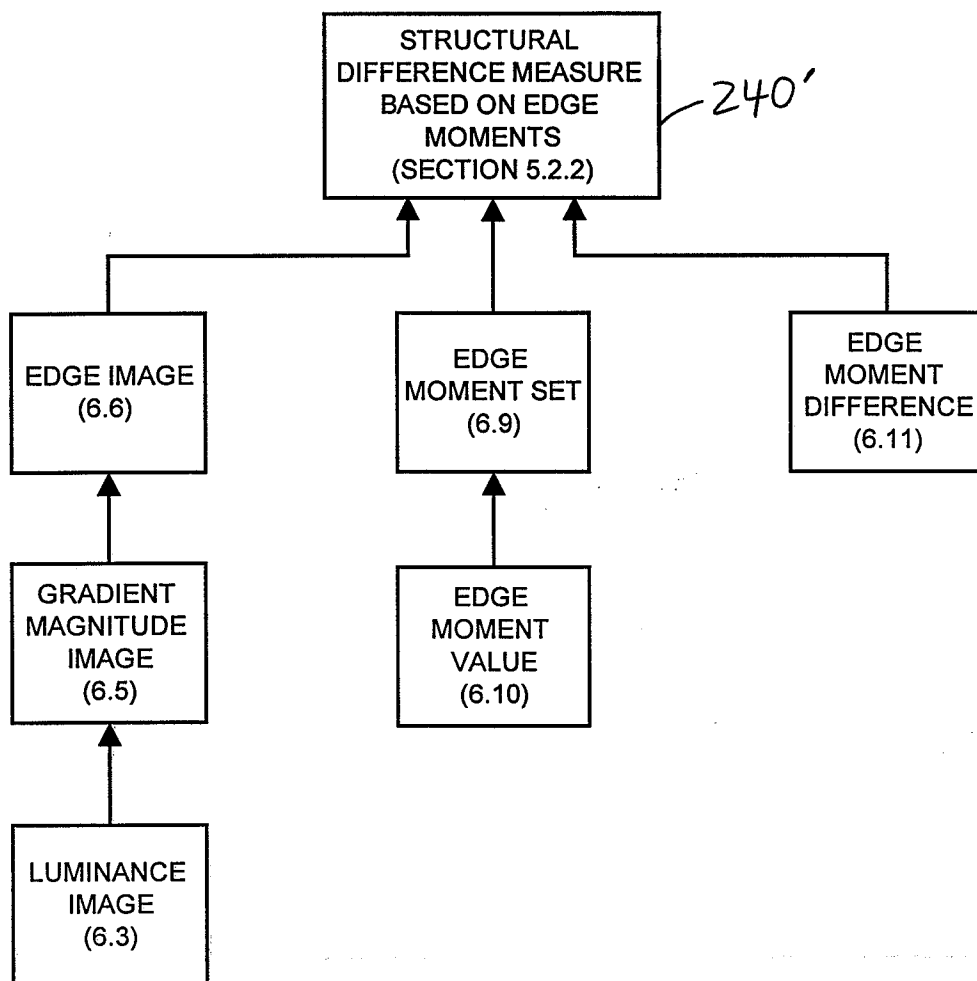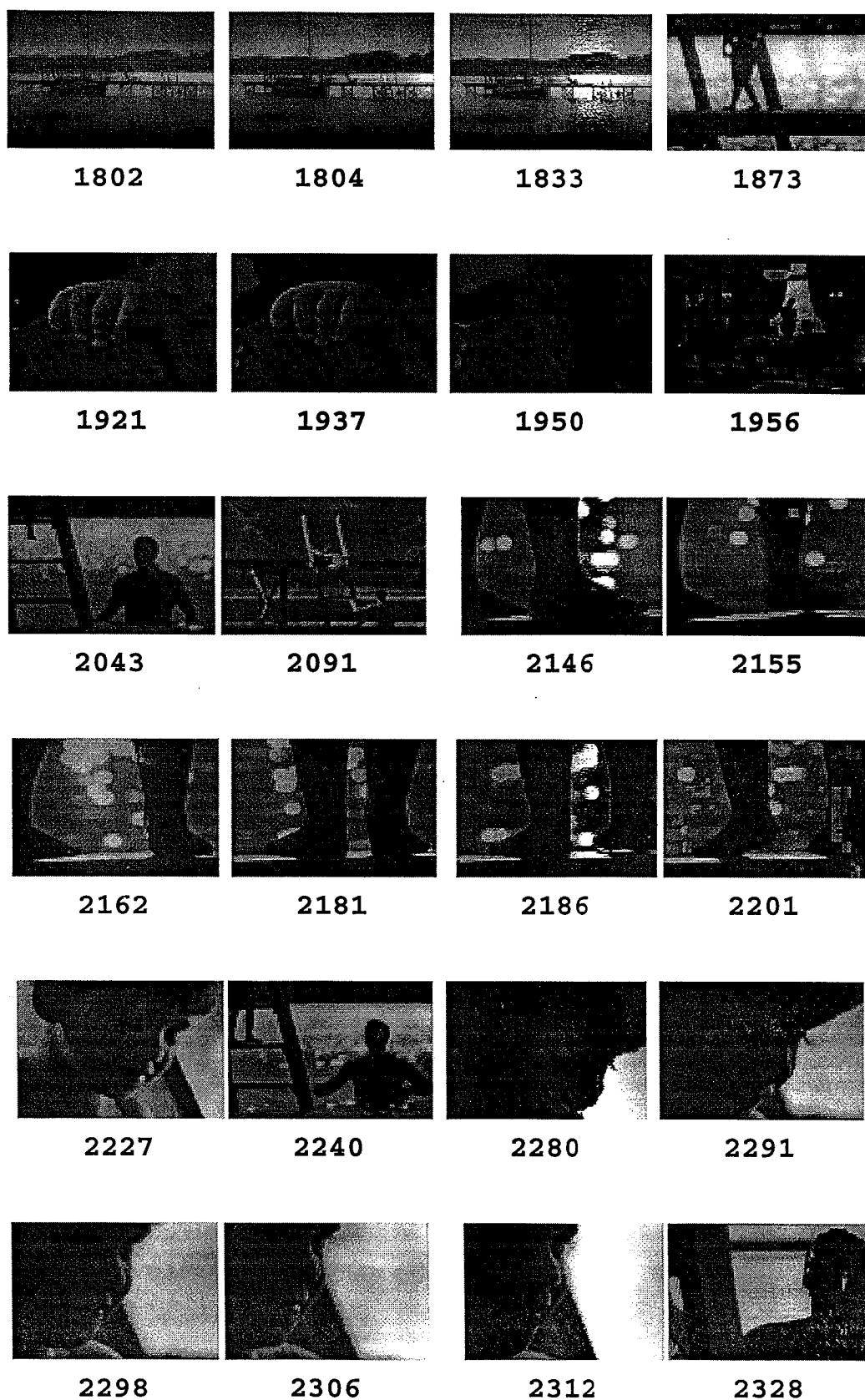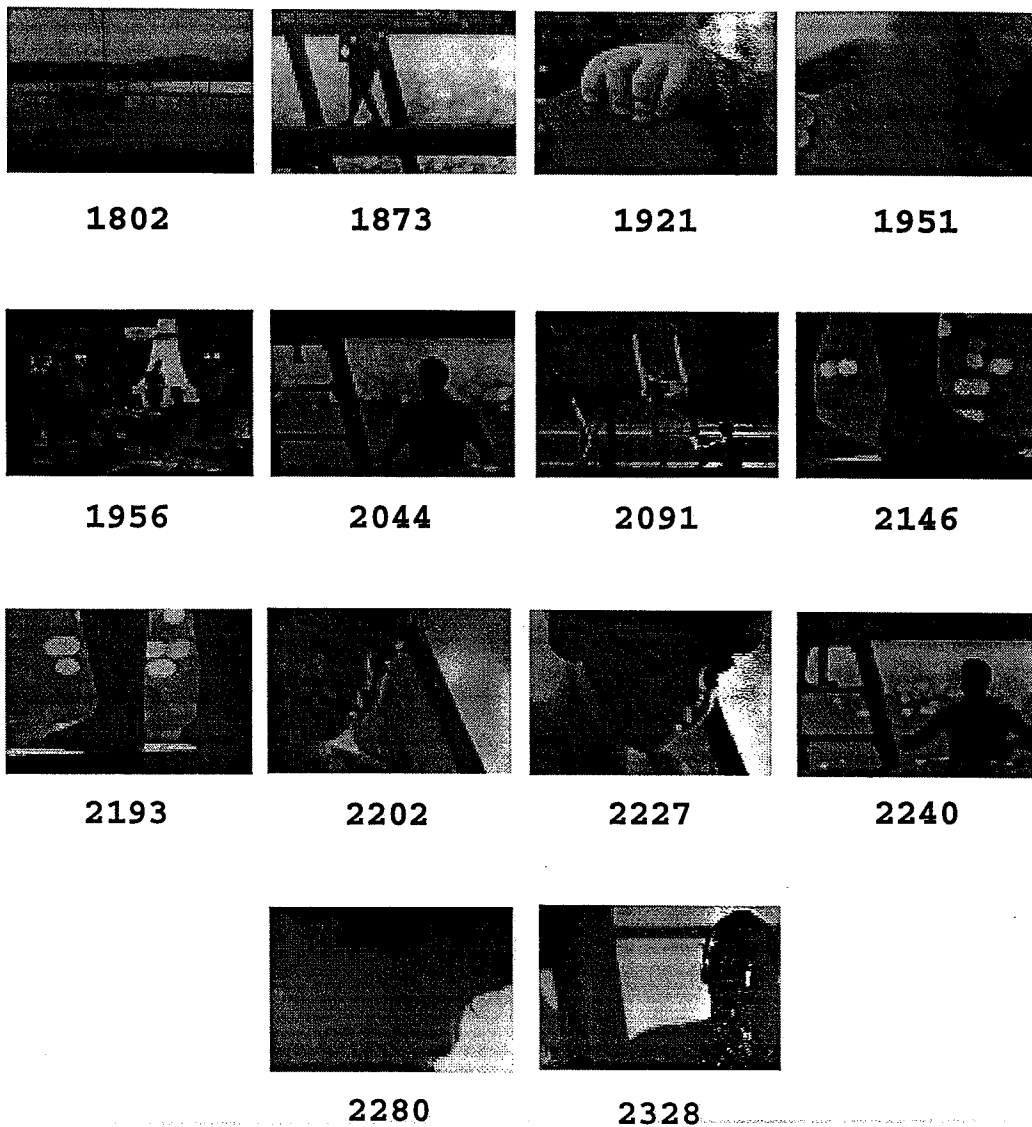
Output of Stage 1: Chromatic Difference (236)

Figure 9 The Results of Applying the invention to 600 frames of a Video sequence

1802 1873 1921 1951

1956 2044 2091 2146

2193 2202 2227 2240

2280 2328

Output of Stage 2: Structural Difference *(240)*

Figure 10 The Results of Applying the invention to 600 frames of a Video sequence